40. (new) The system of claim 38, wherein the system is configured to utilize steam as the gas.

41. (new) The system of claim 38, wherein the second temperature is about 540 degrees C.

42. (new) The system of claim 38, wherein the third temperature is about 25 degrees C greater than the second temperature.

## REMARKS

Claims 1-20 were pending in the application prior to entry of the foregoing amendment. Claim 1 has been amended, claims 2-20 have been canceled, and new claims 21-42 have been added. Claims 1 and 21-42 are therefore pending in the application.

Applicants appreciate the time taken by the Examiner to review Applicants' present application.

Applicant has made an earnest attempt to place this case in condition for allowance. For the foregoing reasons, Applicant respectfully requests full allowance of Claims 1 and 21-42.

The Commissioner is hereby authorized to charge any deficiencies or credit any overpayment to Deposit Account No. 50-0456.

Respectfully submitted,

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## APPENDIX A

1. (amended) A process for the conversion of hydrocarbons containing residues or heavy distillates which may be laden with impurities into light**er liquid** products that may be distilled, the process comprising:

preheating a hydrocarbon load to a first temperature**, wherein the load comprises one or more hydrocarbons selected from the group consisting of residues and heavy distillates;**

**injecting the load into a reactor, wherein the reactor is operated at a second temperature, wherein the second temperature is less than about 520 C and about 20 C-25 C greater than the first temperature;**

**mechanically shearing the molecules of the load with a jet to produce hydrocarbons comprising liquid hydrocarbons, substantially no gaseous hydrocarbons, and substantially no coke or soot**

**[treating the load with a jet having a first amount of energy, thereby transferring at least a portion of the first amount of energy to the load and causing the load to reach an activation energy at which at least a portion of the molecules of the load split into lighter molecules;**

**stabilizing the load at a second temperature in a reactor, wherein the reactor is operated at a first pressure;**

**expanding the load at a second pressure; and**

**passing the load through a series of extractors, at least one of the extractors being configured to demetallize the load, at least one of the extractors being configured to produce water/hydrocarbon emulsions].**

21. (new) A process for the conversion of hydrocarbons containing residues or heavy distillates which may be laden with impurities into lighter liquid products that are substantially free of soot, coke and gases, the process comprising:

preheating a hydrocarbon load;

injecting the load into a reactor, wherein the reactor is operated at a second temperature which is less than a cracking temperature of the load;

passing the load through a high-speed jet, wherein the speed of the jet is sufficient to impart enough mechanical energy to the molecules of the load to cause the molecules to split, wherein substantially all of the split molecules comprise liquid hydrocarbons.

22. (new) A process for the conversion of hydrocarbon residues or heavy distillates into liquid hydrocarbon products with substantially no production of gasses, coke or soot, the process comprising:

preheating a hydrocarbon load to a first temperature, wherein the load comprises one or more hydrocarbons selected from the group consisting of residues and heavy distillates, and wherein the first temperature is below a temperature sufficient for thermal conversion of the load;

introducing the load into the path of a high-speed jet to cause mechanical shearing of the molecules of the load.

23. (new) The process of claim 22, further comprising saturating the sheared molecules of the load in a soaking chamber.

24. (new) The process of claim 23, wherein saturating the sheared molecules of the load comprises utilizing steam for the jet, wherein the sheared molecules of the load are allowed to soak in the steam.

25. (new) The process of claim 22, wherein the jet comprises steam.

26. (new) The process of claim 22, wherein the jet has a velocity of about 700 m/s.

27. (new) The process of claim 22, wherein the jet is preheated to a temperature at which no substantial thermal conversion of the load occurs.

28. (new) The process of claim 22, wherein the load is not vaporized prior to introduction into the path of the jet.

29. (new) The process of claim 22, wherein the load is introduced into the path of the jet in a reactor, wherein the reactor is maintained at a temperature at which no substantial thermal conversion of the load occurs.

30. (new) The process of claim 29, wherein the temperature of the reactor is about 540 degrees C.

31. (new) The process of claim 29, wherein the temperature of the jet is about 25 degrees C greater than the temperature of the reactor.

32. (new) A reactor for the conversion of a hydrocarbon load comprising residues and heavy distillates with substantially no production of gasses, soot or coke, the reactor comprising:

a reactor body configured to maintain a first temperature;

one or more inlets through which a load is introduced into the reactor body, wherein the load comprises at least one of the group consisting of residues and heavy distillates, and wherein the load is preheated to a second temperature; and

a nozzle through which a jet of gas is introduced into the reactor body;

wherein the first and second temperatures are all less than a temperature sufficient for thermal conversion of the load to occur; and

wherein the nozzle and the one or more inlets are positioned to introduce the load into the path of the jet.

33. (new) The reactor of claim 32, wherein the one or more inlets comprise at least two inlets and wherein the inlets are positioned so that the path of the load introduced through each of the inlets converges with the paths of the load introduced through the other inlets.

34. (new) The reactor of claim 33, wherein the paths of the load introduced through the inlets converge at a location which is in the path of the jet.

35. (new) The reactor of claim 33, wherein the one or more inlets are angularly displaced from the path of the jet, and wherein, for each inlet, the corresponding path of the load crosses the path of the jet.

36. (new) The reactor of claim 32, wherein the nozzle is configured to introduce the jet of gas into the reactor at a velocity of at least 700 m/s.

37. (new) The reactor of claim 32, wherein the jet of gas is preheated to a third temperature which is less than the temperature sufficient for thermal conversion of the load to occur.

38. (new) A system for the conversion of a hydrocarbon load comprising residues and heavy distillates with substantially no production of gasses, soot or coke, the system comprising:

a first heater configured to preheat a load to a first temperature, wherein the load comprises at least one hydrocarbon selected from the group consisting of residues and heavy distillates;

a reactor configured to maintain a second temperature, wherein the reactor has a nozzle for injecting a high speed jet into the reactor, wherein the reactor also has an inlet configured to inject the preheated load into the path of the jet in the reactor; and

a second heater configured to preheat a gas to a third temperature, wherein the gas is injected into the reactor through the nozzle to produce the jet;

wherein the first, second and third temperatures are less than a temperature sufficient to cause thermal conversion of the load.

39. (new) The system of claim 38, further comprising a soaking chamber configured to allow sheared molecules of the load to mix with the gas and become saturated.

40. (new) The system of claim 38, wherein the system is configured to utilize steam as the gas.

41. (new) The system of claim 38, wherein the second temperature is about 540 degrees C.

42. (new) The system of claim 38, wherein the third temperature is about 25 degrees C greater than the second temperature.